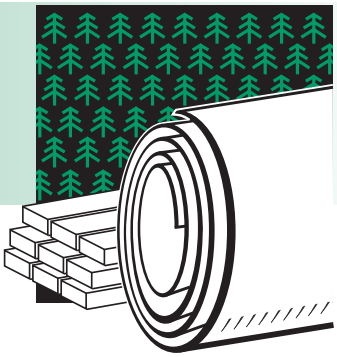
FOREST PRODUCTS

Project Fact Sheet



Utilization of Non-Condensable Gases as "Reburn" Fuel in FPI Wood Waste and Sludge-Fired Stoker Boilers

Benefits

- Provides flexible disposal option for non-condensable waste gas streams
- Reduces use of natural gas compared with co-firing by more than 500 million scf/boiler-year
- Uses an additional 10,000 tons of bark and/or hog fuel, and up to 32,000 tons of sludge/boiler-year as fuel
- Reduces NOx emissions by 50 percent compared to a standard co-firing system
- Eliminates production of 6,000 metric tons/unit-year of CO_2 (because natural gas is not combusted)
- Eliminates need for cofiring burners and incinerator

Applications

There are about 150 wood waste-fired boilers in U.S. mills that generate NCGs. The potential market share for this technology is 60 percent. If the units are available for commercial use by early 2003, market saturation would occur in 5 to 12 years (depending on natural gas prices and enactment of new emissions standards).

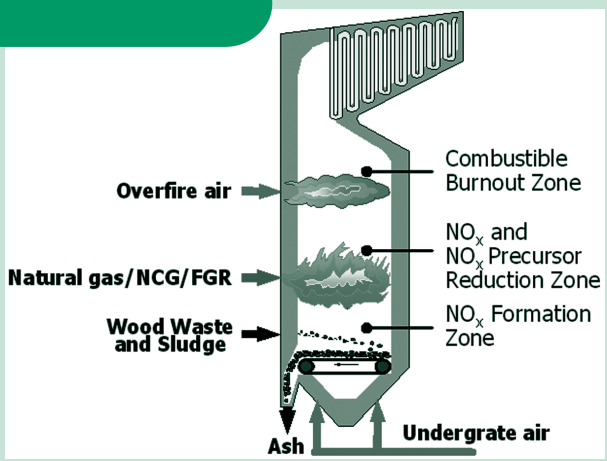
Technology Will Improve Energy and Environmental Performance of Wood Products Mills

Pulp and paper mills require large amounts of energy for their operations, and routinely take advantage of the biomass, sludge, and other processing by-products as sources of fuel. A previously developed METHANE de-NOx reburning technology is commercially successful in improving the efficiency and reducing the emissions of a mill's power-generating combustion system. Natural gas is the preferred reburn fuel with this technology. However, new regulations will be imposed by the Environmental Protection Agency that require the pulp and paper industry to burn a higher percentage of their waste products for fuel and simultaneously reduce their air emissions, particularly NOx.

As the quantity, and therefore, the quality of the available fuel declines, more non-condensable waste gas streams (NCGs) are generated—gases that must be disposed of in an environmentally sound manner. Since natural gas prices have also increased significantly, it is important that researchers develop methods to use these NCGs as potential reburn fuels for mill combustion systems, saving energy costs and ensuring safe disposal of these gases.

The Gas Technology Institute (GTI) will develop and demonstrate an advanced system using NCGs as reburn fuel on a 200,000 lb/hr bark-fired boiler at the Boise mill in DeRidder, Louisiana. Estimates are it will cost $750,000 to purchase and install a unit of the new reburn technology, compared to $4.5 million for the current technology. Annual maintenance costs will fall from $90,000 to $15,000 for each unit installed.

Figure 1.



Reburn process for non-condensable waste gas stream

Project Description

Goal: To develop an advanced version of the METHANE de-NOx reburn technology, which can utilize as reburn fuel non-condensable gases that are by-products of pulp and paper mills.

The two-year project will be based on 10 tasks: (1) Baseline testing of the hog fuel boiler at DeRidder Boiler #2 to determine its energy and environmental profile, byproduct gases, and potential for the technology retrofit; (2) detailed evaluation of its gas system; (3) application of GTI's Fluent-based CFD model, using the data collected in task 1 and 2 to design a METHANE de-NOx reburn design for boiler #2; (4) detailed engineering; (5) procurement and installation, with minimal impact on the mill's steam supply and operations; (6) parametric testing to confirm system performance and potential for long-term operation; (7) long-term testing for up to six months to determine any negative effects on auxiliary equipment; (8) data processing and evaluation of data collected in tasks 1, 2, 6, and 7; (9) validation of model developed in task 3, from parametric and long-term operating data; and (10) project management by GTI, with Babcock Borsig Power assisting with baseline testing, conceptual design, installation monitoring, and performance testing.

Progress & Milestones

- This project is a continuation of the successful project, "Development of METHANE de-NOx Reburning Process for Wood Waste, Sludge, and Biomass Fired Stoker Boilers."
- The METHANE de-NOx reburning technology was successfully demonstrated on Boise Cascade's commercial bark- and sludge-fired plant at International Falls, Minnesota.
- Performance goals for the NCG retrofit system include maximum use of NCGs in a safe and reliable manner, a reduction in cofiring gas use of more than 25 percent, a greater carbon burnout in fly and bottom ash, an increase of 1 to 2 percent in boiler efficiency, and a reduction of more than 40 percent in NOx emissions.
- The technology will gain wide acceptance when it is demonstrated that it (1) introduces waste gases into the reburn zone near the bottom of the furnace, increasing residence time and ensuring complete combustion of waste gases; (2) provides temperatures of 2000 to 2200°F in the reburn injection zone above the grate; and (3) promotes gas mixing and temperature uniformity in the combustion zone and overfire air injection zone, minimizing "cold channels" and the escape of hazardous pollutants.

Project Partners

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Babcock Borsig Power
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